update

SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

No. 49/Spring 1992

Science and Technology — A Package for Progress

New and more efficient technologies are essential for economic growth. They are also the key to environmental protection and the alleviation of poverty. But they are not items which can stand alone. They might include the basic equipment to get from A to B, but their sustainability in any society is dependent upon know-how, the availability of other goods and services, and sound management. It is almost inevitable, therefore, that their selection and effective application in developing countries will be a long-term process.

Environmentally sound

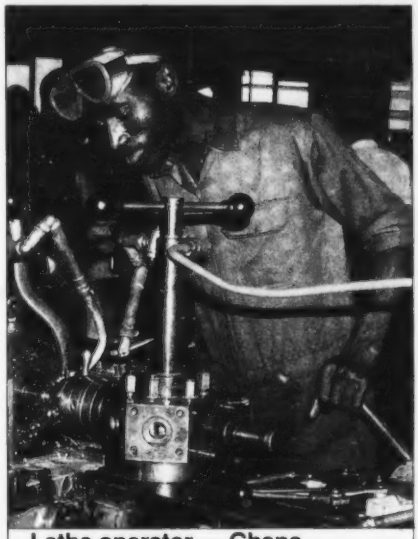
Although the terms under which environmentally sound technologies might be transferred from industrialized to developing countries are contentious, there is relatively little argument over what is necessary for successful technology transfers to take root.

A critical mass of research and development capacity is crucial. An effective use of environmentally sound technologies requires the training of technicians, middle-level managers, scientists, engineers and educators, as well as the development of their corresponding social and managerial support systems.

Nations must also have the capacity to adapt and blend their chosen technologies into the local or national culture. Education and training programmes, therefore, should aim to produce specialists with an interdisciplinary outlook.

Inside

Technology for disabled Pg.2
Cost of global warming Pg.2
Safety and pesticides Pg.3
UNCED and social change Pg.4
Berlin coal conference Pg.5
S&T for child survival Pg.6
Women and technology Pg.7
Mission to Burundi Pg.8
***ATAS News* supplement**



UNDP

Lathe operator — Ghana

Closely related to the demand for environmentally sound technologies and processes is the need for information on which to base sound technology choices. Although much of this information is patented, there is also a good deal which is in the public domain or available through commercial channels. Nations should endeavour to tap this pool and use it as the basis for innovations which suit their specific development priorities.

Information sharing

One proposal which emerged during preparations for the United Nations Conference on Environment and Development (UNCED) was for the development of regional information clearinghouses which could network scientific and technological information in such areas as agriculture, industry and energy. The proposed networks would disseminate information on available technologies, their sources, environmental implications, and the broad terms under which they could be acquired. It was suggested that the networks should have the capacity to help users identify their needs and to then disseminate information tailored to satisfy those needs. This information could include details of successful implementation and referrals to sources of technology advice, training and assessment. The networks could also facilitate joint ventures and partnerships. ■

Update and UN Restructuring

This is the first issue of *Update* since a major restructuring of the United Nations Secretariat was announced by Secretary-General Boutros Boutros-Ghali.

As part of an ongoing process to strengthen the United Nations' effectiveness, *Update* and *ATAS News* have been placed under the umbrella of the Department of Economic and Social Development (DESD), headed by Under-Secretary-General Ji Chaozhu, and a new Science, Technology, Energy, Environment and Natural Resources Division (STEENRD), led by Ms. Dunja Pastizzi-Ferencic. A Science and Technology Branch within the Division is headed by Mr. Carlos Nones Sucre.

DESD consolidates all the functions and mandates of the Office of the Director-General for Development and Inter-

(Cont. Pg.2)

UN Restructuring
(Cont. from Pg. 1)

national Economic Cooperation, the Department of International Economic and Social Affairs, the Department of Technical Cooperation for Development, the United Nations Centre on Transnational Corporations, and the Centre for Science and Technology for Development.

STEENRD combines the functions of the former Centre for Science and Technology for Development, the Energy and Natural Resources Branch of the former DIESA and the Natural Resources and Energy Division of the former DTCD. The functions of coordinating the work of the United Nations system in science and technology for development as well as in new and renewable sources of energy, formerly discharged by DIEC, have also been assumed by this Division.

S&T Branch

The Science and Technology Branch will continue to help strengthen endogenous capacity-building in S&T through policy dialogues with stakeholders under UNFSTD funding, as well as through advisory services to Thailand, Nepal and Tanzania under various trust fund arrangements. It is expected to have a full-scale programme of technical cooperation to meet requests from Member States in the priority areas of:

- endogenous capacity-building for technology assessment and forecasting, and technology management in support of entrepreneurship;
- strategic science and technology development, including the identification of priority research areas and the strengthening of capabilities for industrial restructuring and the conversion of research and technology capabilities from military to civilian uses. ■

New Technologies for Disabled

As the focus of employment in the workplace shifts from brawn to brains, prospects for the disabled appear to be improving. Limitations associated with mobility and the physical manipulation of objects have been reduced, while the need for scientific knowledge and the ability to concentrate on detail and the manipulation of data is increasing.

New computer-based technologies have also expanded the horizons for the disabled. "The miracle of New Technology (NT) is that it can make the blind see and the deaf hear, in a very real sense of what we mean by seeing and hearing", according to a recent report by the International Labour Organisation (ILO). The report examines experiences in more than a dozen countries and deals with technologies which are applicable to nations at different stages of development.

The report is entitled: *New Technologies and the Employment of Disabled Persons* (ISBN 92-2-107757-8). For further information, please write to: The International Labour Office, International Labour Organisation (ILO), CH-1211 Geneva 22, Switzerland. ■

Counting the Cost of Global Warming

A major new study projects that global warming could cost the United States economy alone in the range of 6 to 20 per cent of its GDP.

The study, by William R. Cline for the Institute for International Economics, argues that current projections for a doubling of atmospheric carbon dioxide levels over the next 35 to 60 years are inadequate. He notes that global warming is cumulative and irreversible over centuries and that the economic impact will be much larger than recognized in the current policy debate.

Warming is likely to continue, he says, until at least the year 2300, when deep-ocean mixing of carbon dioxide could begin to partially reverse increases in atmospheric concentrations. In the meantime, global temperatures could rise by a mid-range estimate of 10 degrees Celsius (19 degrees Fahrenheit), and by as much as 14 degrees Celsius, he says. Projecting the damage in current dollar terms, Professor Cline estimates that global warming could cost the US economy some $350 billion a year, including $18 billion in lost agricultural production, $7 billion in damage from a rise in sea level, $11 billion in electricity for additional air-conditioning, $7 billion from reduced water-supply, $5 billion in rising mortality caused by heat stress and $4 billion in urban pollution.

Professor Cline is a Senior Fellow at the Institute and a former Senior Fellow of the Brookings Institution. He is the author of 19 books, and his current study, "Global Warming: The Economic Stakes", will be published with detailed analysis in a new book, *The Economics of Global Warming*.

For further information about the report and book, please contact: Ms. Linda Kean, Institute for International Economics, 11 Dupont Circle, NW, Washington, DC 20036 1207, USA. Fax: (202) 328-9000. ■

ACC Meeting Postponed

The annual meeting of the ACC Task Force on Science and Technology for Development has been postponed until November.

The Under-Secretary-General for Economic and Social Development, Mr. Ji Chaozhu, said that he had decided, in consultation with Task Force members, to allow time for consideration of the outcome of a revitalization of ACC machinery by the Secretary-General, as well as follow-up to the United Nations Conference on Environment and Development (UNCED) and its implications for science and technology activities within the United Nations system. ■

Putting Small Farmers First

A programme to link biotech laboratories with resource-poor farmers in Asia has advanced significantly this year with the launching in Kathmandu, Nepal, of an eight-country network. The Asia Network for Small-Scale Agricultural Biotechnology (ANSAB) will link representatives from about 200 public- and private-sector institutions in an endeavour to commercialize relatively mature and benign agricultural biotechnologies, including microbial soil inoculants (rhizobium and mycorrhiza), mushroom spawn culture, plant tissue culture, blue-green algae biofertilizer, and biopesticides.

WHO/ILO

Partnerships

The network is at the heart of the "Lab to Land" programme of the Washington-based non-profit organization Appropriate Technology International (ATI), which will support 15 projects in an effort to develop viable partnerships between scientists and farmers who have been bypassed by the "green revolution". The programme will address the need for cooperation between the R&D establishment, the business community and the agricultural sector; investment capital; entrepreneurial capability; market definition and penetration; and agricultural extension and training.

The participating countries are Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, Thailand and Viet Nam.

For information

For further information, please write to: Dr. Jack Croucher, Asia Programme Director, AT International, 1331 H Street, NW, Washington, DC 20005, USA. Fax: (202) 628-4622. ■

Reducing Risks Posed by Agrochemicals

UNDP

About one billion people work in the agricultural sector worldwide and many of them use or are exposed to agrochemicals. The International Labour Organisation (ILO) reports that 2 million people are poisoned by pesticides each year and that 40,000 of the victims die. At least 75 per cent of those deaths occur in the developing world following the misuse or mishandling of toxic products.

A number of factors combine to turn the benefits of higher food production associated with agrochemicals into hazards. They include ignorance of the dangers posed by chemicals to human populations and the environment; illiteracy, which prevents users from reading warnings marked on the products; inadequate monitoring of the import and use of especially dangerous pesticides; and inadequate legislative safeguards or the failure to implement them. The use of these products also poses a much wider risk to the general population when they enter the food chain or wash into surface and underground water-supplies.

The ILO has published a new guide, *Safety and Health in the Use of Agrochemicals* (ISBN 92-2-107281-9), for use as a training manual as well as for general information. It has been written in simple language for ease of understanding and translation, and could be used to provide basic safety and health instruction in schools and local communities. For further information, please write to: International Labour Office, International Labour Organisation (ILO), CH-1211 Geneva 22, Switzerland. ■

UNCED

READEX
FICHE

UNCED Wrestles While "Rome" is Burning

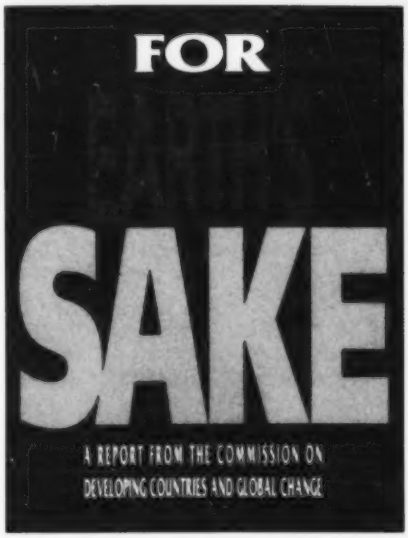
While the United Nations Conference on Environment and Development (UNCED) is seized with long-term biophysical changes on a global scale, many developing countries are already experiencing the worst scenarios on that agenda. The depletion and degradation of natural resources, environmental pollution and natural disasters are life-and-death issues which are part of their day-to-day local experience. As UNCED wrestles with the thorny linkages between environment, development and equity, "Rome" is burning.

New report

A new report, to be released this summer by Canada's International Development Research Centre (IDRC) and the Swedish Agency for Research Cooperation with Developing Countries (SAREC), helps to explain the roadblocks encountered by the UNCED Preparatory Committee en route to the Rio Conference this June. It outlines in clear terms why the global environmental issues which the industrialized countries of the North considered to be pressing were not necessarily the priorities of the South. It observes that "Issues such as global warming and the loss of biological diversity have little meaning for people suffering the day-to-day consequences of starvation, malnutrition or lack of basic health care." It argues that the real solution to the global environmental crisis lies in the eradication of poverty and inequality, and the need for democratic decision-making and effective communication of appropriate knowledge systems and technologies.

For Earth's Sake

The report, entitled "For Earth's Sake", was prepared by seven eminent social scientists representing Central and South America, East and West Africa, and South and South-East Asia. As members of a Commission on Developing Countries and Global Change, they maintain that the main focus of development on rapid economic growth has neglected the broad-based social research which is essential for sound planning.



The Commission argues for the inclusion of social scientists in the environment decision-making process: "In a world dominated by commercialism, management and administration, social scientists have had little or no political or decision-making influence...

Complex

"The relationships between people and their environments are inherently complex, and many modern causes and effects are new to humanity. They need interdisciplinary attention both between the natural and social sciences and within the social sciences themselves. The tendency to address environmental issues by simply adding 'one more variable' to the already existing one-sided analysis must be overcome." ■

Now available

"For Earth's Sake", the report of the Commission on Developing Countries and Global Change ($14.95) is available from the International Development Research Centre (IDRC), Marketing and Distribution Unit, P.O. Box 8500, Ottawa, Ontario, Canada K1G 3H9.

Democracy Progress Pollution

The population of private and commercial vehicles in Eastern and Central Europe could double over the next 20 years, posing a serious additional threat to air quality in the region.

Philip Blackshaw, a principal transport economist with the World Bank, says that while railroads currently carry 75 per cent of the region's goods, new market-oriented policies suggest that newly independent States will follow Western European patterns in which 80 per cent of goods and services move by truck.

In countries like Hungary, where road transport already accounts for 90 per cent of the airborne lead particles, this could be a serious health hazard. Mr. Blackshaw notes that trucks produced in the former Soviet bloc have few or no pollution control devices and run on "dirty" fuels. He recommends that Central and Eastern European countries move towards Western European emission standards, which will require all new cars produced after 1992 to use unleaded gasoline and have catalytic converters to reduce the emission of pollutants.

The World Bank is also advising former Soviet bloc countries to retain their already good public transportation systems as a disincentive to private automobile ownership. "We are trying to advise Eastern and Central Europe to avoid going the route of Western countries which now feel they made a mistake in undercharging for the use of cars, which have displaced mass transit in major cities in many countries", Mr. Blackshaw said. ■

ATAS News

TECHNOLOGY ASSESSMENT AND FORECASTING

No. 16/Spring 1992

Technology Gap Is Self-Reinforcing

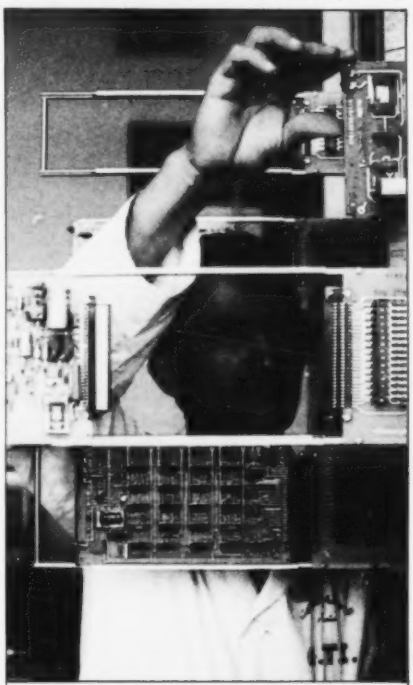
Developing nations have made considerable gains since the 1960s in terms of basic education and life expectancy, but they lag significantly in the areas of higher learning and technology. The newly released Human Development Report 1992 of the United Nations Development Programme (UNDP) observes that gaps between countries of the North and South in terms of technical education, informatics and technological research are particularly disturbing: "The engine of economic progress is technological innovation and increases in human productivity, and this is precisely where the developing countries are being left behind by the rapid strides of the industrial world."

5 p.c. of the computers

This year's report notes, among other things, that:

- The tertiary student enrolment ratio is only 8 per cent in the South compared with 37 per cent in the North. In the least developed countries it is 2 per cent.
- Scientific and technical personnel number only 9 per 1,000 people in the South, compared with 81 in the North.
- Countries in the South appear to have been bypassed by the communications and informatics revolution. Per capita, they have only one eighteenth as many telephone connections, one eighth as many newspapers and one sixth as many radios.
- The South has 80 per cent of the world's people but only 5 per cent of the world's computers.
- Developing countries are responsible for only 4 per cent of the world's research and development expenditure.

These gaps are self-reinforcing, states the report: "The concentration of knowledge in the industrial countries means that further advances also tend to occur there. This gives them a productivity advantage and consequently much higher returns on capital and labour. The higher profit rates in industrial countries enables them to attract yet more capital (even from developing countries) and this facilitates more investment in technology."



UNDP

Communications technician — Yemen

Gaps widen

The report observes that the gaps are widening because basic scientific and technological information is increasingly being privatized. "The kind of information which used to appear in the public domain is now likely to be patented or copyrighted and available only to those who can pay the price. Even to keep up to date with freely available information now demands higher levels of technology to access computer networks."

The report states that this "cycle of concentration" is reflected in world trade where OECD nations can meet consumer demand with skill-intensive production at home and import less from the developing world. The developing world's share of world trade fell from 24.8 per cent in 1980 to 19.3 per cent in 1989.

Focus on human needs

The challenge for developing countries in the coming decade will be to satisfy basic human development needs and invest heavily in human capital formation—particularly in technical and managerial skills: "Unless they acquire greater control over the expanding knowledge industry, the developing countries will languish in the backwaters of low-value-added production." ■

UNIDO

A to Meet in ashington

A comparison of environmental assessment methods used by developing and industrialized countries will be the focus of this annual meeting of the International Association for Impact Assessment (Washington, August 19-22).

The meeting, at the World Bank headquarters, will emphasize the treatment of "reversibles" and "irreversibles" in the context of sustainable development, together with the evolution of assessment methods and their diffusion.

1993 meeting

The IAIA is already planning its 1993 meeting, to be held in Shanghai, China (June 11-15). This 12th annual event will emphasize relations between development and the social and natural environments. IAIA meetings typically involve several hundred participants concerned with development and the impact of emerging technologies. Papers describe new analytical methods, case-studies, policy analysis and conceptual models to assess technology impacts.

Call for papers

Those who wish to present a paper or poster to the 1993 meeting are requested to submit a 150- to 300-word abstract in English as soon as possible to: Prof. Zhu Liang-Yi, IAIA '93 Meeting Chair, Shanghai Institute of Science and Technology Management, Shanghai 201900, China. Fax: (86) 21 3290385; or to: Prof. Alan Porter, IAIA '93 America/Europe Prog. Chair, Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0205, USA. Fax: (404) 894-2301. Copies of the preliminary 1993 programme are available on request from the IAIA Executive Office, P.O. Box 70, Belhaven, NC 27810, USA. Fax: (919) 964-2340.■

Proposal for Assessment and Forecasting Network

A workshop organized by the Science and Technology Branch and the Office of Technology Assessment (OTA) of the United States has recommended that the United Nations assist with the establishment of a Technology Assessment Network (TAN). It was suggested that the network's membership should comprise institutions from industrialized and developing nations with a strong technology assessment component, who would:

- share their collective experience and resources;
- keep the membership abreast of assessments being undertaken by others;
- create opportunities for members to participate in, or contribute to, assessments being carried out by others;
- open new opportunities for training and internships among network members.

A questionnaire has been circulated to institutions and United Nations focal points to gauge existing technology assessment and forecasting capacity and interest in future cooperation.

For a copy of the questionnaire or additional information, please contact: Mary Pat Silveira, Science and Technology Branch (STEENRD/DESD), Room 1074, 1 U.N. Plaza, N.Y. NY 10017, USA. Fax: 212 963-4116.■

The Sweet Smell of Success

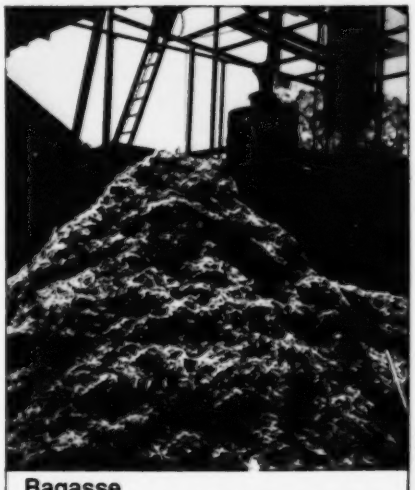
The small island nation of Mauritius hopes to be generating 15 per cent of its electrical energy from the combustion of sugar cane waste by mid-decade. The World Bank has approved a $15 million loan and the Global Environment Facility (GEF) is contributing a $3.3 million grant towards adaptive research and the construction of a 22-megawatt powerplant over the next three years.

It is proposed that the $55 million plant would burn fibrous sugar cane waste to supplement coal following the annual harvest. When fully operational, the plant is expected to generate 75 per cent fewer sulphur dioxides and nitrogen oxides than a diesel plant and to reduce emissions of greenhouse gases by 10 to 20 per cent.

Sugar has been a mainstay of the economy of Mauritius since the 17th century and remains the largest net earner of its foreign exchange.

The Government and private sugar producers agreed last year on the need to make greater use of sugar by-products such as bagasse, which is separated out when the cane is crushed, and the GEF grant will be used for technology studies and technical support to develop its potential.

World Bank economist Lars Vidaeus said that although other countries have experimented with sugar cane residues other than bagasse to produce energy, Mauritius will become the major centre for adaptive research and trials in this area over the next five years. Mr. Vidaeus said the Bagasse Energy Development Programme would support studies on environmental impact, storage, boiler design and fuel mix configuration. Experiments would be conducted at sugar estates or factories and, based on the results, the industry would invest in biomass energy development using cane tops, leaves and trash.■



UNDP

Bagasse

There's Money in Waste

Poverty places severe limitations on the waste disposal options for developing countries, many of which have yet to install sewerage systems, even in their cities. But a common weed which purifies waste water contaminated by excreta, which has a protein content similar to that of soya beans and which can be sold as a cash crop for fattening fish and feeding human populations could transform the environment and health of poor communities throughout Asia and other third world regions.

Duckweed

The plant is Lemnacaea, or duckweed, which grows prolifically at temperatures in the range of 15° C to 30° C. In waste waters rich in nitrogen, phosphorus and potassium, the vibrant green plant with its tiny leaves can double its weight every two to four days. An American-based non-profit organization known as the Prism Group has been experimenting with patented duckweed systems in Peru, Mexico, Bangladesh, Egypt and the United States for a number of years, and its chairman in Bangladesh, Mohammad Ikramullah, has described the plant as "green gold".

Answer to sanitation

In Bangladesh, where 97 per cent of the population is without sanitation services and where half of all surface water is contaminated by fecal matter for half the year, the cultivation and harvesting of duckweed has enormous potential.

Mr. Ikramullah reports that waste water treatment systems covered in duckweed can produce crystal-clear water with a phosphorus and nitrogen content of less than 0.5 milligrams per litre within 20 days. During this process, the weed can be continuously harvested to yield one tonne per hectare per day and sold retail for $27 a tonne.

"Obscenely profitable"

The harvest can triple average yields when fed to fish, but it can also be dried and added to chicken feed. "It is a fabulous feed for fish", says Mr. Ikramullah. "It is fantastic for treating waste water and it is obscenely profitable for farmers."

Prism, Bangladesh has been experimenting with carp raised in ponds where freshly harvested duckweed is the only source of food. The ponds have yielded more than 10 tonnes of carp per hectare per year, compared with just 400 kilograms under traditional aquaculture. At an average price of $2 per kilo of fish, the net return is about $16,000 per hectare per year.

UNDP Support

The United Nations Capital Development Fund of UNDP is currently supporting the introduction of Prism's technology to 10 villages in central Bangladesh. Farm families will be encouraged to channel their waste into derelict ponds surrounding the villages, where it will fertilize the organized harvesting of duckweed by individual farmers on one-quarter-hectare "plots" sectioned by bamboo poles. Weed production is so vigorous under these controlled conditions that a quarter hectare fed by effluent from about 100 people is about all one farmer can harvest alone.

Health food

Word of duckweed's versatility and food potential is spreading rapidly. While Mr. Ikramullah believes it is the food of the future for protein-poor nations like Bangladesh, Israeli farmers have been touting it as a food for the wealthy. They are harvesting and marketing it as a salad in health-food shops across Europe. ■

UNDP

UNDP

Duckweed (above) requires intensive harvesting

Assessment Seminar

Harold A. Linstone, Professor Emeritus of Systems Science at Portland State University, was the guest of the Branch for Science and Technology for Development at a recent in-house seminar.

Professor Linstone discussed his "multiple perspective" approach to helping systems practitioners bridge the gap between analysis and models and action in real-world situations. Among the real-world situations touched upon during the seminar were the Exxon Valdez oil spill, the Bhopal chemical leak and accidents at the Chernobyl and Three Mile Island nuclear powerplants.

Prior to his academic career, Professor Linstone worked for two decades in the aerospace industry, including service at the Rand Corporation and as Associate Director of Corporate Planning at the Lockheed Corporation. He has advised UNDP and ESCAP's Asian and Pacific Centre for Transfer of Technology and is the author of several books. He is also the founder and Senior Editor of the International Journal on Technological Forecasting and Social Change. The journal is available by subscription only. For further information, please contact: Prof. Harold A. Linstone, Systems Science Dept., Portland State University, P.O. Box 751, Portland, OR 97207, USA. ■

Global Warming Threatens a Tide of Ecological Refugees

...ising sea levels caused by global ...arming and the melting of polar ...caps could force a major exo... ...eople from small island States ...coastal areas of more heavily ...d nations.

...ding on one's projections, the ...f ecological refugees could ...a trickle to a flood. The Cli... ...te, in Washington, D.C., re... ...NCED in April that sea levels ...between 4 and 6 inches this ...ccording to median pro... ...d rise a further 8 inches by ...6 inches by 2100.

...g forces

Conscious of the fact that scarce land resources are already disappearing beneath the waves, 37 island nations with a combined population of about 23 million have banded together to plead their case for urgent steps by the industrialized countries to arrest the build-up of greenhouse gases in the Earth's upper atmosphere. Among the early casualties, Maldives in the Indian Ocean has already evacuated four small islands because of coastal flooding, and Seychelles, farther to the south, reports that its tourist beaches are slowly shrinking. The small Pacific nation of Vanuatu cautions that whole islands in its 80-island chain would disappear beneath the waves if sea levels rose by 12 inches or more.

Although some of the larger developing nations are anxious not to compromise their development by committing themselves to curbs on future energy consumption, large countries like China also have a major incentive to head off the effects of global warming. The Laboratory for Coastal Research at the University of Maryland, USA, estimates that a 3-foot rise in sea level would leave some 72 million people homeless in China, 11 million in Bangladesh and 8 million in Egypt—four times the population affected in the island collective with just three mainland States counted. ■

Technology Assessment Seminar

The Science and Technology Branch is organizing a special international seminar to address issues related to technology assessment (TA) and forecasting capacity in developing countries.

The seminar, which will be held at UNESCO headquarters in Paris from 25-29 January, 1993, will include a comprehensive analysis of current approaches and system methodologies for technology assessment, monitoring and forecasting, and of the capacities and institutional arrangements necessary to make them effective tools for decision-making in development.

Focal point

The seminar will also advise on the role of the Department of Economic and Social Development (DESD) as the focal point in the United Nations system for technology assessment. It will have a core group of experts complemented by representatives from other relevant United Nations organizations, as well as intergovernmental and non-governmental organizations involved in technology monitoring, assessment and forecasting. ■

Pre-heater Cuts Energy Use

A solar water "pre-heater" has been designed in India to reduce the cooking time and energy needed to prepare food. The device, invented by Dr. A. Jagadeesh, President of the Society of Science for the People in the state of Andhra Pradesh, can be fabricated with local materials for about $30. It can heat water to a temperature of about 70 degrees Celsius, depending on available sunshine, thereby reducing the amount of fuel needed to bring rice, vegetables or beverages to the boil.

The basic "pre-heater" consists of a 50-litre stainless steel drum of the kind commonly used to store water in India. The drum is fitted with taps at the middle and base and is painted black. It is then wrapped in two layers of thick, transparent polythene sheet to cut radiation and convection loss and to shield the heat-absorbing surface from the wind. The tank is erected in a sunny place on an insulated base of rice straw in proximity to a portable heat reflector. The curved reflector comprises a movable bamboo screen covered with tin foil, which can be oriented to make the most effective use of the sun's position.

The tank is filled from the top with potable water in the early morning and can be tapped from midday onwards. Because of convection, the hottest water can be tapped from the middle of the tank.

Dr. Jagadeesh recommends that water be drawn at the hottest point of the day and stored in well insulated and sealed clay jars for use during the evening. Tests with large clay pots, lined with concrete and well wrapped in black polythene, show that hot water can be stored for 15 hours with only a 5-degree-Celsius loss in temperature. Dr. Jagadeesh says that cooking time can be further reduced if rice, dal, maize, beans and other foods are pre-soaked, because water is a better conductor than air.

For further information about this and other energy-saving devices, please write to: Dr. A. Jagadeesh, President, Society of Science for the People, 2/210 Nawabpet, Nellore 524 002 Andhra Pradesh, India. ■

ATAS News is a regular supplement to the Update newsletter of the Science, Technology, Energy, Environment and Natural Resources Division (STEENRD), its objectives are to inform scientists and planners of activities in technology assessment and forecasting, to serve as an information medium for the ATAS Technology Assessment Network and to highlight the implications of new technologies for developing countries. *ATAS News* offers readers an open forum to address these and related issues at the national, regional and international levels. Submissions for publication are welcome.

Newsworthy articles, special reports, and photographs and other illustrative material should be sent to: The Science and Technology Branch, 1 U.N. Plaza, N.Y., N.Y. 10017, USA. Telex 232422 UNHUR and 62450 UNATIONS. Cable, UNATIONS NEW YORK. Telefax (212) 9634116.

ATAS News is edited by Ian Steele. ■

Berlin Coal Conference

Clean-coal technologies are needed at all stages of the energy production and consumption cycles, but developing countries and economies in transition will need greatly improved access to environmentally sound alternatives if their contribution of CO_2 to global warming is to be contained.

An international round table on Environmentally Sound Coal Technologies (Berlin, 12-15 May) noted that while industrialized countries generated the lion's share of CO_2, more than half of the annual increase in CO_2 emissions was caused by developing countries. Some 47 per cent of the world's electricity generation is based on coal, and many developing countries, as well as economies in transition, look primarily to coal-fired plants to provide the electrical power associated with improved standards of living. Nations including China and India rely heavily on energy from coal and have no near-term alternatives to meet their expanding needs.

Strategies

The Berlin meeting strongly emphasized the need to discuss energy- and environment-related issues in the context of development: "Strategies to cope with a reduction of greenhouse gas emissions and other global environmental challenges have to incorporate measures which address the areas of poverty, population patterns, economic growth and international trade."

UNCED

The Berlin report surveyed major themes before the United Nations Conference on Environment and Development (UNCED) and the United Nations Convention on Climate Change, under five main headings, as follows: clean-coal technology options; efficient energy management; measures taken in China, India and Russia to enhance coal-based energy efficiency and to reduce coal-related environmental stress; international cooperation in the transfer of environmentally benign technology and in financial and managerial assistance; and implications of the Convention on Climate Change.

The Berlin round table was part of a conference series initiated in Saarbrucken, Germany, in May 1990 by the former UNCSTD, and drew on the work of conferences, held in Beijing, China (December 1991), and Madras, India (January 1992). It also drew on preparatory studies by the Moscow International Energy Club for a planned international conference on Environmentally Sound Coal Technologies in Moscow at a date to be announced.

Proposals

The Berlin meeting was attended by representatives of 37 public- and private-sector organizations from 15 countries, as well as representatives of the United Nations Department of Economic and Social Development (DESD), the Economic and Social Commission for Asia and the Pacific (ESCAP), the United Nations Industrial Development Organization (UNIDO), the International Energy Agency (IEA), the World Coal Institute (WCI) and the Moscow International Energy Club (MIEC).

Among the proposals made:

- Energy investments should be based on integrated resource analysis and management, including the internalization of environmental and social costs.
- Inventories and other information and data sources should be encouraged as a means of disseminating knowledge of coal-based energy issues, technology options and contact points. The list of organizations involved in clean-coal technology programmes produced by the World Coal Institute is a good example.
- Pilot projects should be used to demonstrate the benefits of clean-coal technologies in local contexts.

WHO

- Regional/global clean-coal technology centres should be established to focus on technologies and related policies. ■

Recycling in China

China reuses more than 10 million tonnes of inorganic waste a year, and a special unit within the Ministry of Commerce encourages the effort by giving tax breaks to companies that recycle or use recycled products.

The largest and most diverse company in the waste business is the Shanghai Resource Recovery and Utilization Company, which draws on refuse from a city population of 13.5 million and about 100,000 registered companies. The company makes a net profit of $19 million a year after paying 62 per cent of its earnings to the central Government. It reduces the waste build-up in municipal dumps and provides employment for some 25,000 people who man a network of more than 500 waste-purchasing stations. In 1990, the company recycled an average of 4,300 tonnes of waste a day. Among the materials it recycles are iron and steel, photographic film, rubber tyres, perspex, glass and plastics. ■

Sustainable Technologies for Children in Unsafe Environments

ne of the first and most dramatic
gns of a nation's failure to safe-
uard the environment is a de-
in the health of its children—its hu-
an capital and stake in the future.
ressed farmlands and forests
insufficient food and fuel for
eeds, while unsafe water-sup-
inadequate sanitation encour-
seases and compound the daily
malnutrition. Some 40,000 chil-
n the poverty of these environ-
very day.

port for low-cost technologies,
ging from immunization and oral
ation therapy to hand-operated
pumps and hydroponic garden-
g, has enabled the United Nations Children's Fund (UNICEF) to peg back some of the worst consequences of poverty and humankind's mismanagement of the environment. These interventions have also reminded Governments that available technologies and attention to the obvious can save millions of lives every year. Among the environmentally and economically sustainable solutions advocated and supported by UNICEF and partner agencies are the following:

• Immunization: National immunization campaigns this year will reach more than 100 million infants—80 per cent of the world's total—at an average cost of about $13 a child. UNICEF and organizations such as WHO are sponsoring the search for a "super" vaccine which could reduce that cost even further by packing multiple vaccines into a single "shot" or time-release microcapsules. A "super" vaccine would slash the logistical expense of reaching and vaccinating each child five times in its first year of life in order to provide full immunization against six main killer diseases.

UNICEF

Child receives ORS

• Oral rehydration salts: Oral rehydration mixes to replace the water and minerals lost during bouts of diarrhoea are distributed throughout the developing world in sachets costing about 10 cents apiece. Knowledge of this inexpensive remedy and access to ORS prevented some 1.1 million deaths from dehydration last year.

• Breast-feeding: Nature's own guarantee of healthy child growth is becoming an endangered practice in countries where infant formula substitutes are marketed and sometimes promoted through hospitals and clinics. UNICEF and WHO launched a "Baby-friendly Hospital Initiative" in 1991 to promote breast-feeding as the first and best option for child survival everywhere. WHO estimates that bottle-fed babies are 15 times as likely to die from diarrhoeal diseases and four times as likely to die from pneumonia as are babies who are exclusively breast-fed.

• Clean water and sanitation: An estimated one billion people lack access to safe drinking-water and two billion live in communities without sanitation services. The health of populations in many thousands of these communities is being improved by the provision of handpumps and latrines at a cost of $30 and $20 per capita respectively. In some communities, the needs are being satisfied at even lower cost using gravity-feed and rainwater harvesting systems. In Brazil, drinking-water is decontaminated by passing it through titanium alloy plates charged with a low DC current.

• Fuel-efficient stoves: To reduce fuelwood consumption and respiratory ailments caused by smoke inhalation, improved stoves and ovens have been developed in many developing countries to encourage the use of charcoal, biogas and solar power for cooking.

• Home gardening: Drought and disease-resistant varieties of crop staples such as cassava, millet, maize, sorghum and grain legumes have been introduced to many communities to raise food production and nutrition levels. Small-scale irrigation, agroforestry and intercropping techniques have enhanced returns from vegetable and livestock raising, and in Bogotá, Colombia, landless residents have been taught hydroponic methods to grow vegetables on their rooftops. ■

WHO

Administering polio vaccine

UNDP

Solar oven

Developing Crops to Combat Global Warming

The International Rice Research Institute (IRRI) at Los Banos in the Philippines is approaching the halfway mark in a five-year study of the impact of climate change on rice.

Rice is the staple food for one third of the world's population and the scientists at IRRI are hopeful that plant breeders will be able to produce cultivars which are less sensitive to the increased ultraviolet-B (UV-B) radiation which results from depletion of the Earth's protective ozone layer by chlorofluorocarbons (CFCs).

CFCs are gaseous emissions from the industrial chemicals which are used as refrigerants and aerosol propellants. They have been responsible for the erosion of between 1 and 4 per cent of the ozone layer over the past 20 years, said Victoria Coronel, an assistant scientist at IRRI. She said that depletion was predicted to continue at a rate of 0.4 per cent a year and that the tropics, where the ozone layer was naturally thinnest, received the highest levels of UV-B radiation.

"Enhanced UV-B radiation stunts plant growth", explained Dr. B. S. Vergara, head of IRRI's UV-B research. "Most plants exposed to more radiation are shorter, with smaller, thicker leaves. Plant dry weight, or total biomass, decreases. Cells and tissues are also damaged."

Rice is grown in a wide range of climatic, soil and water conditions in diverse geographical regions, and Dr. Vergara said that there were more than 120,000 existing varieties, which could be expected to respond differently to increased UV-B radiation.

IRRI is currently screening more than 100 rice cultivars in a controlled environment with 40 per cent ozone depletion, to select germplasm that is less sensitive to UV-B. Investigations as to the impact of increased UV-B radiation on rice plant diseases and insect pests are also under way, and new field studies are planned to determine how UV-B radiation affects rice yields. ■

Technology Takes Women from Farm to Factory

Mexico: A group of rural women from Veracruz recently made an extraordinary transition from farm work to management of their own factory.

In 1987, women from the municipality of Tempoal were working 18-hour days managing poor households and helping their husbands farm small plots of land. They had no formal job training, no paid employment and no way of borrowing money if they needed seeds, fertilizer or other tools to raise their productivity and income. National surveys showed that the area in which they lived had one of the highest unemployment rates and some of the lowest health and literacy averages in the country.

A way out of this poverty trap appeared when a number of women asked the local office of the United Nations Food and Agriculture Organization (FAO) for training to raise chickens and pigs. With funding from the United Nations Development Programme (UNDP), meetings and workshops were organized and a revolving loan fund was set up to help launch the women in small businesses. Over the next two years, they tried their hands at pig and poultry farming, aquaculture and the raising of sheep, sugar cane, maize and oranges. They were mostly successful, and from there they branched into the milling of livestock feed and meat processing.

As their operations diversified, they organized themselves into several groups and established Mexico's first regional rural women's organization, the Asociacion de Mujeres Campesinas de la Huasteca, A.C. The Association received financial support from the United Nations Development Fund for Women (UNIFEM) and by 1989 was managing the loan fund independently and supporting its members' needs.

The next, and most dramatic, step was the enrolment in 1989 of a number of women in a metalwork training programme. The women took up wrenches and blowtorches and learned to work on lathes, and the Colombian-based appropriate technology centre, "Las Gaviotas", introduced a prototype hand-pump as a potentially viable product for them to manufacture.

By 1991 there were some 250 women from 11 different groups in Tempoal actively involved in the overall project and 20 full-time specialists engaged in the hand-pump factory. It is envisaged that the hand-pump operation will eventually have the capacity to produce 5,000 units a year for sale in Mexico and for export to Asia and Africa. Potentially, hundreds of thousands of poor women could benefit from this enterprise, which is producing a low-cost alternative to their hauling and carting of domestic water-supplies from frequently unhealthy sources.

There is the potential also for women trained by the project to branch into the production of other appropriate and environmentally sound technologies. One future possibility under discussion in Mexico is the development of a centre for research, development and the adaptation of appropriate technologies for poor women. The centre would be managed by women and stimulated by their own perceptions of what they need. ■

UNICEF

The third world market for low cost hand-pumps is huge

Expert Consultation in Burundi

The impact of science and technology on the development prospects of the world's least developed countries (LDCs) was the focus of a meeting in Bujumbura, Burundi, from 4 to 8 May.

The meeting of high-level S&T experts recommended, among other things, that:

- LDCs place greater emphasis on the development of locally available resources, and human capabilities in particular;
- Governments take steps through early education to develop the public's familiarity with science so that it is seen as a part of everyday life rather than something which is highly complex and foreign;
- Governments place greater emphasis on infrastructure for S&T policy-making, and support potential technology users in the private sector.

Participants said that technology should not be viewed simply as the application of hardware. They said that emphasis on technical know-how, management and organization were crucial to effective and sustainable usage, as was effective marketing of S&T to ensure the widest technological diffusion and usage. Transferred technologies should reflect local demand and be adaptable to local conditions. The rural agricultural sector was said to be in particular need of the means to articulate its S&T needs.

The Burundi meeting was organized by the Government of Burundi and the Science and Technology Branch to examine a case-study of national S&T experiences in consultation with leaders from the private and public sectors. It looked at technologies in the context of industrialization and regional economic integration, and examined the transformation of publicly funded industrial R&D institutions in the context of privatization. It also provided guidelines for implementing development programmes which were mindful of stakeholder objectives in the private sector.

The Burundi meeting followed a series of initiatives by the former Advisory Committee on Science and Technology for Development (ACSTD), whose work has been assumed by a new Commission on Science and Technology for Development following the restructuring of intergovernmental bodies of the United Nations. (See story on Page 1.)

Integration

Participants observed that regional integration, driven in part by the speed of technological change, had been a cost-effective means for many countries to keep pace with market forces. They noted, in particular, the success of the European Community, the Association of South-East Asian Nations (ASEAN), the support of the OAU and the ECA for the development of an S&T protocol for the African Economic Community, and the goals of the newly formed "Bolivar Programme" for Latin American nations. ■

UNDP

Cassava chips in solar drier — Ghana

The Bolivar Programme

Eleven Latin American nations launched the "Bolivar Programme" earlier this year to pave the way for faster technological development and improve the competitiveness of the region's goods and services globally. The principal obstacles to S&T growth in the region are said to be barriers to co-operation between countries and poor relations between research centres and productive enterprises.

The programme will try to foster cooperation through a network of national commissions representing government authorities, chambers of commerce, public and private banks, development institutes, leaders from universities and the scientific and technological communities, legislators, union leaders, media, and officials of regional and international organizations. Commissions have so far been established in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela.

The Bolivar Programme hopes to:

- create a dialogue between companies and research institutions;
- establish joint ventures among companies and research institutions of two or more countries of the Latin American and Caribbean region or other regions;
- develop new products, processes and services, and improve the quality and market share of those already existing;
- achieve homogeneous quality of international standard;
- enhance national productive capacity.

For more information, please contact: The Bolivar Programme Executive Secretariat, Apartado Postal 70617-Los Ruices-Caracas, Venezuela. Fax: 58-2 359288. ■

For further information, contact:

The Science and Technology Branch
United Nations
New York, New York 10017
United States of America
Telephone: (212) 963-8435
Fax: (212) 963-1267
Update and ATAS News
Edited by Ian Steele

A periodic newsletter to provide information on the progress made and related to the Vienna Programme of Action on Science and Technology for Development.

UPDATE is a quarterly publication of the Science, Technology, Energy, Environment and Natural Resources Division (STEENRD). It is prepared, edited, published and distributed by the Science and Technology Branch free of charge to all Member States, national focal points and intergovernmental and non-governmental organizations as well as to individuals upon request.